

Jorgenson Travel Award:

Estimating genetic parameters of digital behavior traits and its relationship with production traits in purebred pigs

Mary Kate Hollifield, Ching-Yi Chen,
Eric Psota, Justin Holl, Daniela Lourenco, Ignacy
Misztal

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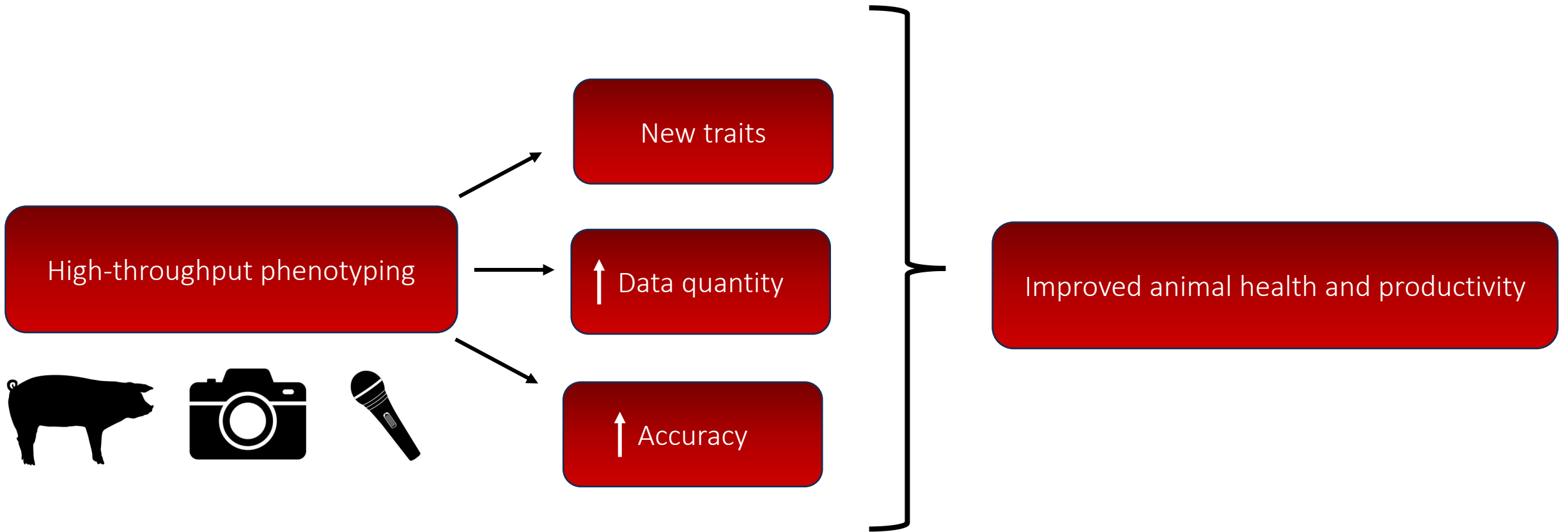


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Introduction





Objectives



- Create data quality control SOP
- Identify behavior patterns
- Estimate genetic parameters
- Genetic correlation with production traits
- Determine if full recording period is needed



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 - Back fat (BF)
 - Loin depth (LD)
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Materials & Methods

- Day-wise behavioral data extracted from video recordings
 - 12 pens, one camera per pen
- Two lines
- Females only
- 2008 pigs x 70 days = 140,560 data points
- Behavior traits:
 - Eating time, drinking time, distance
 - Laterally lying time, sternally lying time, sitting time, standing time



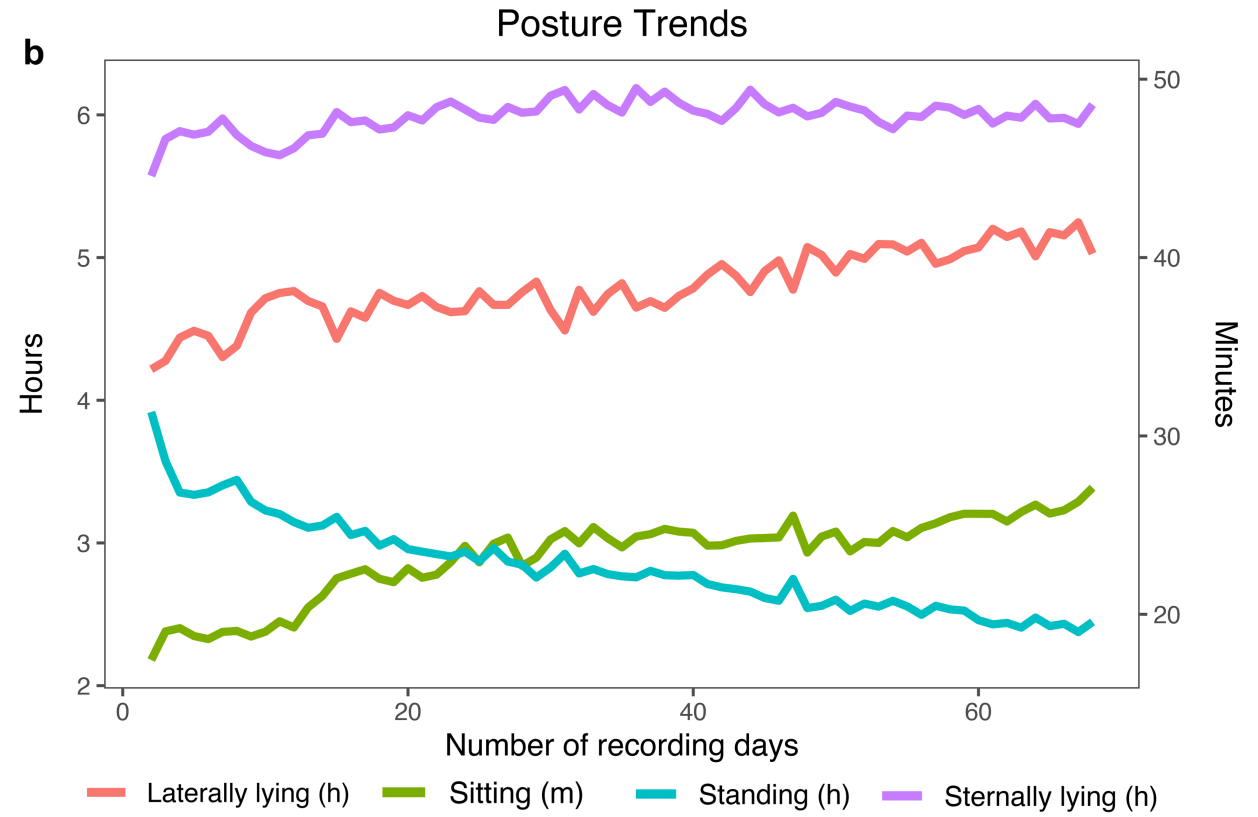
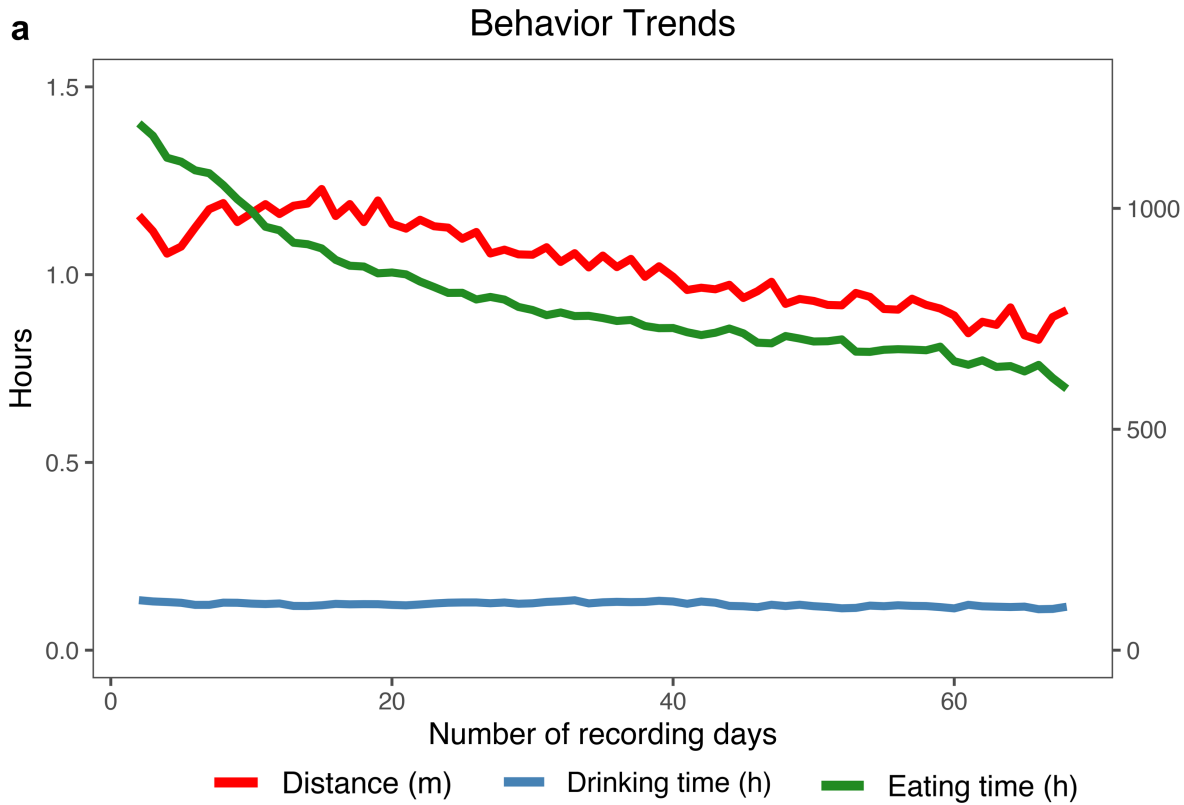
Data Cleaning SOP

- Remove:
 - All data before 03-17-2022
 - Start and end day records
 - Records from the day the animal was culled
 - Records from days with less than 8 hours of recording time
 - Distance/standing time records < 15 meters/minute
- Standardize all records to 14 hours

	Before Cleaning	After Cleaning	After Cleaning + Off-test
# Individuals	2008	1327	1079
# Records	119812	77423	71873



Average Trends



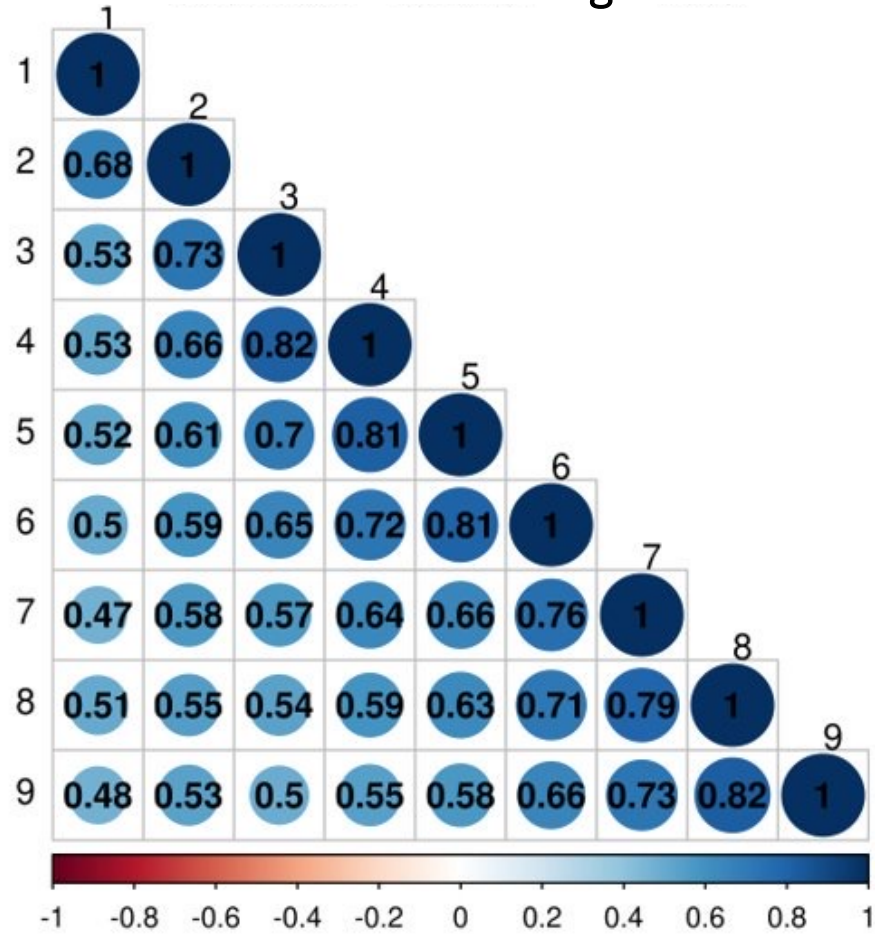


Phenotypic Correlations

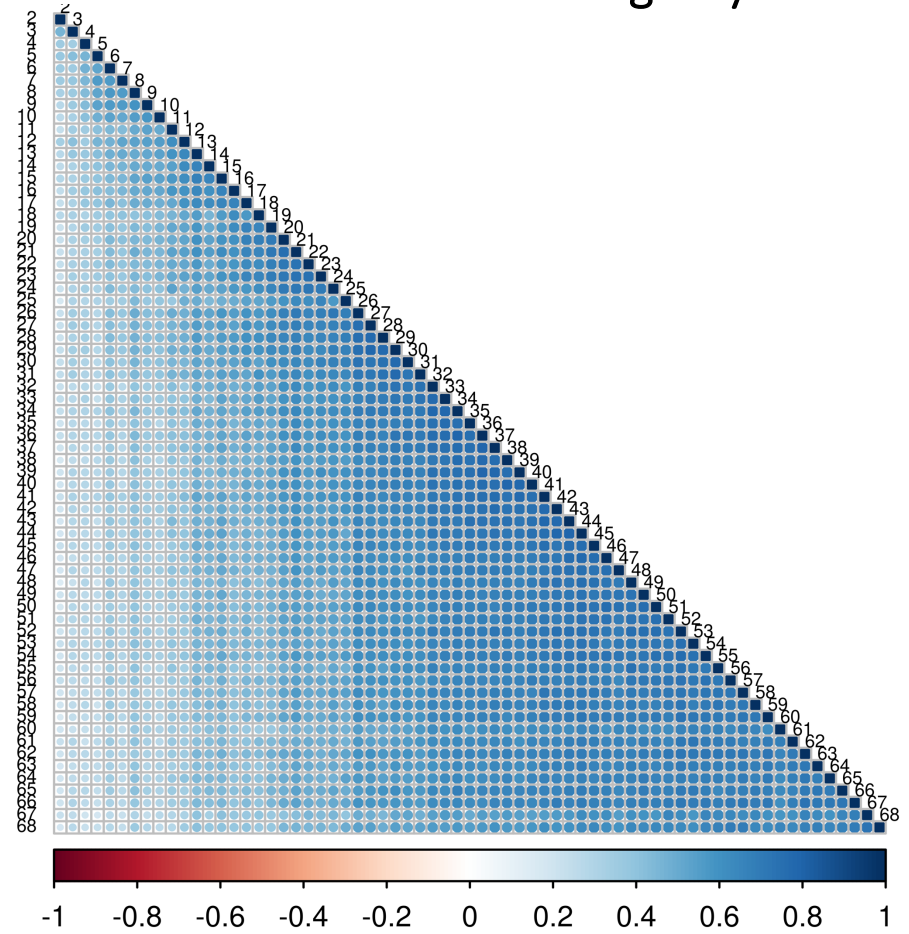
	Eat	Drink	Lat. Lying	Stern. Lying	Sitting	Standing	Distance	ADG	BF	LD	ADFI_EBV
Eat		0.15	-0.31	-0.01	-0.04	0.59	0.26	0.06	0.05	0.05	0.08
Drink			0.03	-0.19	0.05	0.20	0.16	-0.02	0.05	-0.09	-0.03
Lat. Lying				-0.82	-0.20	-0.52	-0.23	-0.07	-0.00	-0.14	-0.09
Stern. Lying					0.09	-0.03	-0.14	0.13	0.01	0.19	0.17
Sitting						-0.14	-0.06	0.11	-0.02	0.09	0.10
Standing							0.63	-0.10	0.00	-0.06	-0.13
Distance								-0.18	-0.01	-0.14	-0.23
ADG									0.29	0.52	0.37
BF										0.10	-0.9
LD											0.25
ADFI_EBV											



Distance – Recording Weeks



Distance – Recording Days

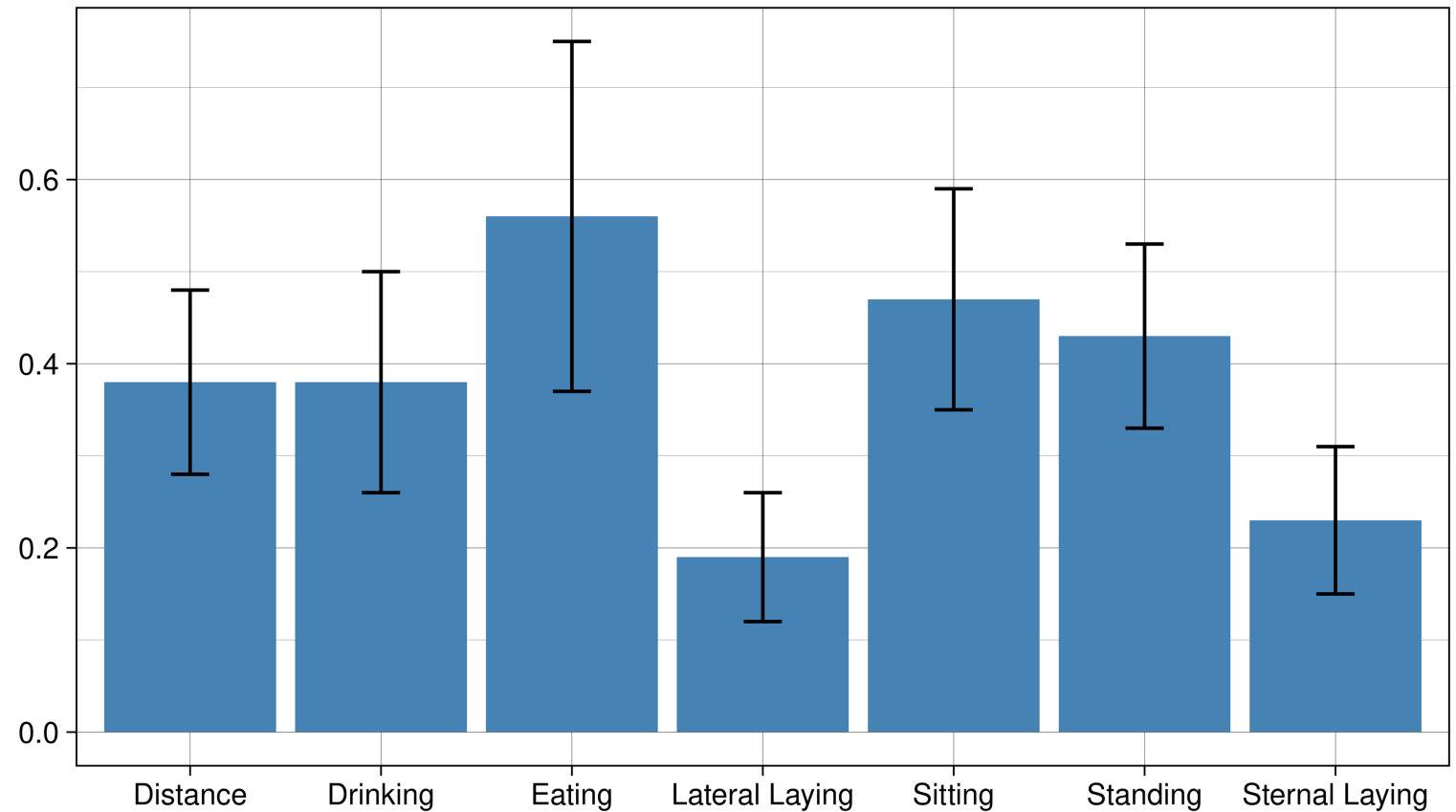




Model

- $y = line + CG + litter + animal + residual$
- CG: Off-TestDay_Year
- airemlf90

Heritabilities





Genetic Correlations



	Eat	Drink	Lat. Lying	Stern. Lying	Sitting	Standing	Distance	ADG	BF	LD
Eat		0.38	-0.40	-0.41	-	0.69	0.45	-	0.18	-
Drink			-0.33	-0.43	0.26	0.62	0.44	0.32	0.18	-
Lat. Lying				-0.84	-0.23	-0.72	-0.68	0.50	0.19	0.24
Stern. Lying					-0.25	-0.62	-0.58	0.26	-	-
Sitting						-0.48	-	0.26	-	0.19
Standing							0.93	-0.56	-0.17	-0.37
Distance								-0.57	-0.27	-0.48
ADG									0.56	0.84
BF										0.21
LD										



- Two trait model: BF, Behavior trait time interval
- $y = line + CG + litter + animal + residual$

Genetic Correlations

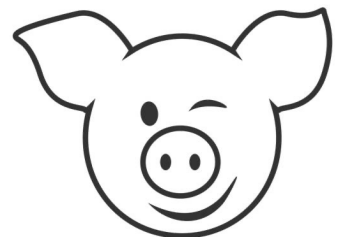
Time Period	Eating Time	Drinking Time	Lateral Laying	Sternal Laying	Sitting	Standing	Distance
All	0.18 ± 0.07	0.21 ± 0.11	0.19 ± 0.09	-0.04 ± 0.09	-0.01 ± 0.08	-0.17 ± 0.07	-0.26 ± 0.09
Days 1-13	0.22 ± 0.07	0.29 ± 0.12	0.26 ± 0.10	-0.22 ± 0.13	0.11 ± 0.12	-0.10 ± 0.07	-0.23 ± 0.14
Days 14-26	0.23 ± 0.08	0.37 ± 0.19	0.21 ± 0.16	-0.18 ± 0.16	-0.03 ± 0.09	-0.05 ± 0.07	-0.11 ± 0.10
Days 27-40	0.19 ± 0.08	0.21 ± 0.13	0.20 ± 0.11	-0.08 ± 0.10	-0.01 ± 0.07	-0.14 ± 0.08	-0.21 ± 0.14
Days 41-54	0.11 ± 0.08	0.14 ± 0.10	0.14 ± 0.09	0.05 ± 0.09	-0.02 ± 0.08	-0.22 ± 0.09	-0.34 ± 0.13
Days 55-68	0.05 ± 0.08	0.02 ± 0.16	0.13 ± 0.09	0.14 ± 0.10	-0.04 ± 0.09	-0.28 ± 0.08	-0.37 ± 0.10



Conclusions



- Digital Phenotyping -> Alternative method to capture novel phenotypes in high volume
- Quality control is needed prior to any analysis or interpretation of data
- Behavior traits have low to moderate correlations with production traits
- Digital phenotyping provides opportunity for enhancing genetic gain





Animal Breeding and
Genetics Group

*College of Agricultural &
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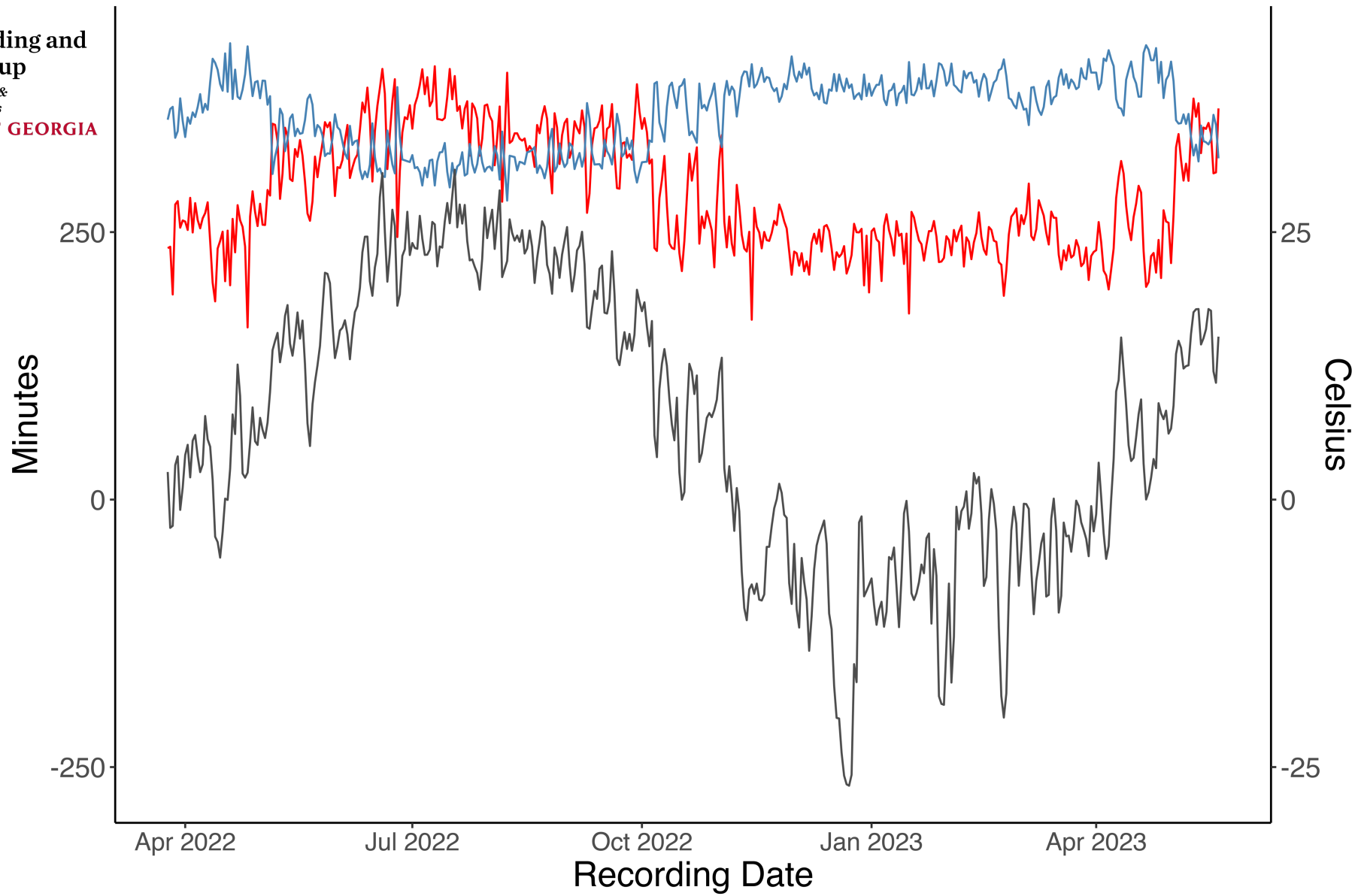
Thank you!



SCAN ME

marykate.hollifield@uga.edu





— Laterally Lying Time — Sternally Lying Time — Temperature